

## **CLAIMS**

What is claimed is:

1               6. The adsorption filter material of claim 1, wherein said activated carbon  
2 particles have a specific surface (BET) of at least 800 m<sup>2</sup>/g, and up to 1,500 m<sup>2</sup>/g.

1               7. The adsorption filter material of claim 1, wherein said activated carbon  
2 fibers are produced by carbonization and subsequent activation of suitable organic  
3 starting fibers.

1               8. The adsorption filter material of claim 7, wherein said organic starting  
2 fibers are selected from the group comprising cellulose fibers, fibers based on cellulose  
3 derivatives, phenol resin fibers, polyvinyl alcohol fibers, pitch fibers, acrylic resin fibers,  
4 polyacrylonitrile fibers, aromatic polyamide fibers, formaldehyde resin fibers,  
5 divinylbenzene-crosslinked polystyrene fibers, lignin fibers, cotton fibers, and hemp  
6 fibers.

1               9. The adsorption filter material of claim 1, wherein said activated carbon  
2 fibers comprise an activated carbon fiber textile material.

1               10. The adsorption filter material of claim 1, wherein said activated carbon  
2 fibers have a mean fiber diameter of 1-25 µm.

1               11. The adsorption filter material of claim 1, wherein said activated carbon  
2 fibers have a length-specific weight (titer) of 1-10 dtex.

1               12. The adsorption filter material claim 1, wherein the mean particle  
2 diameter of said activated carbon particles is at least three times greater than the mean  
3 fiber diameter of the activated carbon fibers.

1               13. The adsorption filter material of claim 1, wherein a total amount of  
2 activated carbon in said activated carbon particles and said activated carbon fibers in  
3 said adsorption filter material is 25-300 g/m<sup>2</sup>.

1               14. The adsorption filter material of claim 2, wherein said first activated  
2 carbon layer and said second activated carbon layer are arranged relative to each other  
3 such that they border directly on each other or are arranged one directly above the  
4 other.

1               15. The adsorption filter material of claim 1, wherein at least one of said  
2 activated carbon particles and said activated carbon fibers are impregnated with a  
3 catalyst.

1               16. The adsorption filter material of claim 15, wherein said catalyst is  
2 selected from among metals and metal compounds, said metals being selected from the  
3 group comprising copper, cadmium, silver, platinum, palladium, zinc, and mercury, and  
4 their compounds.

1               17. The adsorption filter material of claim 15, wherein said catalyst is  
2 impregnated by an amount equal to 0.01 to 15 wt.% of said at least one of said  
3 activated carbon particles and said activated carbon fibers.

1               18. The adsorption filter material of claim 1, wherein at least one of said  
2 first layer and said second layer is an air-permeable textile material.

1               19. The adsorption filter material of claim 1, wherein at least one of said  
2 first layer and said second layer is rendered oleophobic.

1               20. The adsorption filter material of claim 1, wherein at least one of said  
2 first layer and said second layer is a support layer for said adsorption layer.

1               21. The adsorption filter material of claim 2, wherein one of said first layer  
2 and said second activated carbon layer comprises a support layer for said first activated  
3 carbon layer, and wherein one of said second layer and said first activated carbon layer  
4 comprises a support layer for said second activated carbon layer.

1               22. The adsorption filter material of claim 1, wherein said adsorption filter  
2 material is formed as an air-permeable multilayer composite material that comprises  
3 several layers joined together.

1               23. The adsorption filter material of claim 1, wherein said adsorption filter  
2 material has a total weight of 75-1,000 g/m<sup>2</sup>.

1               24. The adsorption filter material of claim 1, wherein said adsorption filter  
2 material is gas-permeable and air-permeable, and the gas-permeability and air-  
3 permeability of said adsorption filter material is greater than 50 L•m<sup>-2</sup>•s<sup>-1</sup>, and as high as  
4 10,000 L•m<sup>-2</sup>•s<sup>-1</sup>.

1               25. The adsorption filter material of claim 1, wherein said adsorption filter  
2 material has a water vapor permeability of at least 5 L/m<sup>2</sup> per 24 h.

1               26. The adsorption filter material of claim 1, further comprising at least  
2 one barrier layer between said adsorption layer and at least one of said first and second  
3 layers.

1               27. The adsorption filter material of claim 26, wherein said barrier layer is  
2 designed to be permeable to water vapor and essentially impermeable to gas and air.

1               28. The adsorption filter material of claim 26, wherein said barrier layer is  
2 at least essentially impermeable at least retards passage of toxic chemical agents and  
3 chemical warfare agents.

1               29. The adsorption filter material of claim 26, wherein said barrier layer is  
2 at least essentially impermeable or at least retards the passage of liquids and aerosols.

1               30. The adsorption filter material of claim 26, wherein said barrier layer is  
2 applied as a continuous closed layer on one of said first and second layers.

1               31. The adsorption filter material of claim 26, wherein a thickness of said  
2 barrier layer is 5-500 µm.

1               32. The adsorption filter material of claim 26, wherein said barrier layer  
2 comprises at least one of a plastic and an organic polymer.

1               33. The adsorption filter material of claim 26, wherein said barrier layer  
2 comprises one of a multilayer laminate and a multilayer composite comprising several  
3 layers of plastic or polymer.

1               34. The adsorption filter material of claim 26, wherein said adsorption  
2 filter material has a water vapor permeability of at least 10 L/m<sup>2</sup> per 24 h with said  
3 barrier layer at a thickness of 50 µm.

1               35. The adsorption filter material of claim 2, wherein said adsorption filter  
2 material is a composite material with several successive layers bonded to one another,  
3 wherein said adsorption filter material contains the following layers in sequence:

4               said first layer, wherein said first layer comprises a textile that has been  
5 rendered oleophobic;

6               a water vapor-permeable and at least essentially gas-impermeable and  
7 air-impermeable barrier layer;

8               said adsorption layer, wherein said adsorption layer comprises said first  
9 activated carbon layer with said activated carbon particles and said second activated  
10 carbon layer with activated carbon fibers; and

11              said second layer, wherein said second layer comprises a textile layer.

1               36. The adsorption filter material of claim 1, wherein said adsorption filter  
2 material is thermally stable.

1           37. Use of the adsorption filter material of claims 1 for producing  
2 protective materials.

1           38. The use of the adsorption filter material of claim 37, wherein said  
2 protective materials are selected from the group consisting of protective suits for civilian  
3 or military use, protective gloves and protective covers.

1           39. Use of the adsorption filter material of claim 1 for producing filters and  
2 filter materials for the removal of noxious substances, foul-smelling substances, and  
3 toxic substances of all types from air and gas flows, the filters and filter materials being  
4 selected from the group consisting of gas mask filters, deodorant filters, surface filters,  
5 air filters, filters for room air purification, adsorptive support structures, and filters or filter  
6 materials for medical applications.

1           40. A protective material including one of a protective suit, a protective  
2 glove, and a protective cover, produced using said adsorption filter material of claim 1  
3 and including said adsorption filter material.

1           41. A method for improving the breakthrough behavior of an adsorption  
2 filter material having a first layer, a second layer, and an adsorption layer arranged  
3 between the first layer and the second layer, said method comprising the step of  
4 forming the adsorption layer using a combination of activated carbon fibers and granular  
5 or spherical activated carbon particles, such that the activated carbon particles and the

- 6 activated carbon fibers are present in one of a single activated carbon layer or in
- 7 separate activated carbon layers which border each other.